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V.—*Hints on the Subject of Geographical Arrangement and Nomenclature.*—Communicated by Colonel Jackson, F.R.G.S. (St. Petersburgh). Read 24th March, 1834.

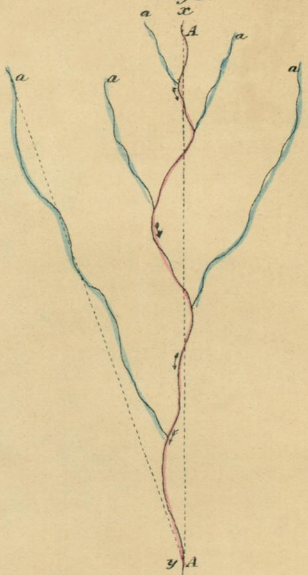
ACTUATED by an ardent desire for the advancement of geographical science, and unable, from the stationary situation I now hold, to contribute to its progress by anything new in the way of travels, I shall venture to draw the attention of the Royal Geographical Society to a subject which I have ever regarded as of considerable importance ;—I mean the systematic arrangement of the objects of the science, the establishment of a precise and comprehensive nomenclature, and the further improvement of maps.

No period certainly was ever so favourable for such an undertaking as the present. Geography, long considered puerile, has at length received from philosophers the degree of attention it so justly merits; and from the societies now formed for the special purpose of its progress, civilized nations expect that guidance which shall lead by the shortest and surest road to a perfect knowledge of the globe ; and not only do they expect guidance, but they are willing to be led, provided due regard be paid to such customs as, from long continuance, have settled into habits not easily overcome.

Hence the establishment of a definite order and nomenclature can meet with no other obstacle than that which arises from the difficulty of amalgamating the new wants of the science with its old habits,—a difficulty certainly great, but by no means insurmountable. To this object, therefore, I would invite the attention of my learned colleagues, convinced that when they shall have produced a system, it would, at their recommendation, be readily adopted by travellers, whose works, now universally read, would soon render it popular.

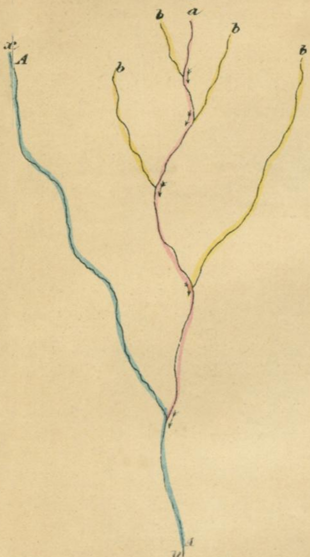
By a system, I mean only such a methodized arrangement of facts and objects already known as shall serve to render our acquaintance with them more complete, our notions more precise. Unfortunately no science, perhaps, presents greater difficulties to an exact classification than geography, for in no one are the objects which compose it so naturally indefinite in their limits. A natural order, on the one hand, seems almost impossible, while, on the other, it is difficult in many cases to seize upon such characteristics as shall determine our choice in an artificial arrangement; and when to this disadvantage we add the inveterate tenacity with which men in general cling to long-established usage, it will appear evident that nothing short of the maturest deliberation, and the united judgment of many, can accomplish the arrangement of a method likely to be adopted.

Fig 1.



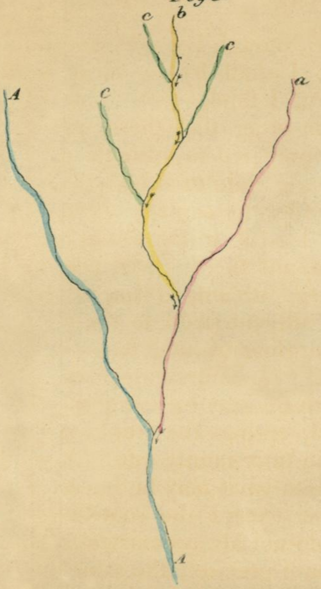
A . Principal Recipient
a . Affluent of A .

Fig 2.



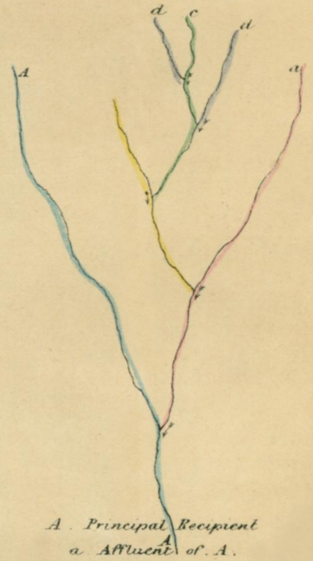
A . Principal Recipient
a . Affluent of A .
b Affluent of a .

Fig 3.



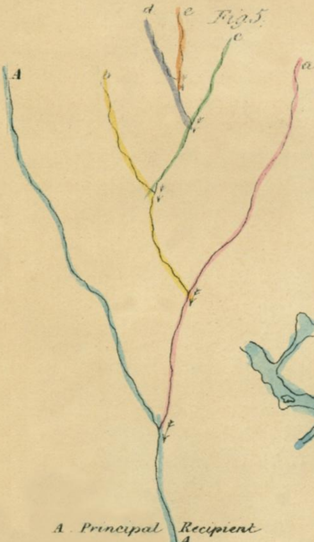
A . Principal Recipient
a . Affluent of A
b . Affluent of a
c . Affluents of b

Fig 4.



A . Principal Recipient
a . Affluent of A .
b . Affluent of a .
c . Affluent of b .
d . Affluent of c .

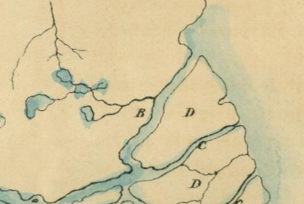
Fig 5.



A . Principal Recipient
a . Affluent of A .
b . Affluent of a
c . Affluent of b .
d . Affluent of c .
e . Affluent of d .

Illustrations to
COLONEL JACKSON'S
PAPER.

Fig 6.



A.B. Deltoid Branches.
C . Anadel Branches.
D . Deltoid Islands.

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C. Bradbury

Thus, though I would strongly urge the necessity of the undertaking, I shall by no means disguise its difficulties. On the contrary, I think, they cannot be too prominently set forth at once, in order that those who enter upon the task may come to it fully prepared to struggle against all obstacles, and hence be the more certain of success.

In order to explain the nature of the difficulties to which I allude, I shall instance the case of *rivers*; an object taken at random, and the first that presents itself to my mind.

A large stream, if traced upwards from its mouth along its several affluent rivers to the smallest streamlets which bring their little gurgling tribute, bears considerable resemblance to a tree. The several bifurcations and canals which form the deltas of many rivers may be compared to the roots, from which, as we proceed, springs the trunk, and from this the larger branches, which in turn ramify into subordinate branches and sprigs, and finally into what may be likened to fibres or terminal tendrils.

If we except the root-like appearance produced by deltas, which do not always exist, it will be found that large and small rivers have precisely the same kind of distribution, and only differ in the size, number, and direction of their parts. The small are miniatures of the large, both bearing to each other the same relation which a young tree does to a full-grown one. The trunk of the former may be smaller in all its dimensions than even a subordinate or secondary branch of the latter, but the young tree is nevertheless perfect in all its parts. It is, therefore, the position and direction of the parts which constitute them trunk or branch, and not their absolute dimensions. The same reasoning holds good of rivers; so that, if each part had a specific name, these names would apply alike to streams of very different dimensions. So far, however, from each kind of ramification, either of trees or rivers, having a name, we have in English, as applied to the former, but the two divisions of trunk and branch, and for the latter also two, those of river and brook*.

The French have three distinct terms, but they are too vaguely defined to be of much use. Thus with them the *Fleuve* is defined *une grande rivière, qui se rend sous le même nom de sa source à la mer;* the ***Rivière**, une eau qui coule dans un lit assez profond pour porter bateau, et qui se jette dans un fleuve;* the ***Ruisseau*** is *un petit courant d'eau.*

A very litle observation will suffice to show the inadequacy of these definitions. Almost all the streams which, taking their rise on the western slope of the Andes, fall directly into the Pacific, have the same name from their source to the sea, as well as, or even more generally than, the great streams which, flowing from the opposite side of the same mountains, discharge themselves into the Atlantic. To apply therefore the same definition and the same name to objects so different, seems as absurd as it would be to call a mountain a mole-hill. I know it may be urged that I have only taken a part of the definition which says *une grande rivière*, &c.; but what is the size, I would ask, which establishes the distinction between *fleuve* and *rivière?* and if dimensions are to decide the question, what is to be regarded—the length of course, the breadth, the depth, or all of these together, or the quantity of water furnished?

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* We have *rivulet* and *streamlet*, but they are synonymous with *brook*, being but diminutives, the former of the general term *river*, and the latter of the still more generic appellation *stream*, applicable alike to all running waters.

Nor is the term *rivière* more satisfactorily settled. It is a stream flowing in a channel or bed (*lit*), sufficiently large and deep to admit of boat navigation. But what will do for one species of boat will not do for another, and as the kind of boat is not mentioned, nothing is defined. Moreover, the *rivière* empties itself into the *fleuve:* what, then, are those streams which, being large, ay, and very large, and navigable for the largest boats, flow, not into a *fleuve* but into another *rivière*—as for instance, the Wabash, which falls into the Ohio, itself a *rivière* and not a *fleuve*, according to the definition, as it does not fall directly into the sea, but into a *fleuve*, the Mississippi? The Wabash cannot be called a *ruisseau*, it is to all intents and purposes a *rivière*, but a *rivière* must fall into a *fleuve:* what then becomes of the definition?

The line of distinction between *rivière* and *ruisseau* is not better defined; for a small *rivière* is often a large *ruisseau*, and *vice versa.* The French, then, with their three orders of streams, are just as much confused as ourselves with our *rivers* and *brooks.*

The present arrangement therefore is evidently insufficient, and the establishing of a new one is by no means an easy task, as we shall soon see.

The first step towards the formation of a nomenclature is a classification of the objects to be named, after which such names must be assigned to these several objects as shall best specify them. With regard to streams, then, two things may be considered;—1st. their arrangement as independent hydrographical systems, each being regarded as a distinct individual belonging to, and enclosed within, a general basin, unconnected (unless by accident, design, or some rare exception) with any other basin; and 2nd, the arrangement of the several parts of which a system is composed.

With regard to the first of these objects it may be observed that, with the exception of such streams as empty themselves into lakes and swamps having no apparent issue, or of such as lose themselves in subterraneous passages so as to be no further traced by any subsequent exit, all the waters which flow on the surface of the earth disembogue themselves into the sea: some simply and directly, others by means of channels not their own, with which they communicate mediately or immediately.

Now such is the irregularity of the earth's surface, that a stream communicating *singly* and directly with the sea, can in general have but a very limited course; for if the course be long, it is sure to be met by other courses; and if very long, these courses which it meets will, in their turn, be long and be met by others, and so on to four, five, and perhaps in some cases to six successively,—all the streams so connected forming collectively a system.

The question now is, shall we range all the individual systems into one general order, whatever may be their length or the number of their ramifications, and consequently assign to them but one generic name, in which case they would be distinguished from each other only by the proper name of the principal-stream of each? or shall we arrange them into a number of classes according as they are composed of one, two, three, &c. orders of ramifications? for if we would class the systems at all, I see but this alternative. By the first of these methods each individual system would indeed be indicated, but nothing of its nature would be specified; by the second we should be a little better informed, though by no means adequately. Previous, however, to explaining the difficulties of this latter arrangement, I will endeavour to show the still greater difficulty of founding a classification of rivers on any other consideration than that of the several orders of ramification they exhibit.

Were we to attempt a classification founded upon the length of the principal recipients of each system, we should soon find that, from the gigantic Mississippi, whose course is, I believe, about three thousand seven hundred miles, down to the Thames, whose length is about two hundred and fifty, and from this down to the shortest, although the extremes are widely different, the intermediate terms descend in so gradual a ratio as to preclude the possibility of any thing like a natural division.

If we should seek a principle of classification in the medium breadth and depth of the main streams of the several systems, or their width at the mouth, or the *number* of affluent streams, or even the superficial extent of the basins of each system, or the quantity of water they furnish, we should in like manner find that not only under each of these arrangements the rivers would be differently placed, but the progression in each list would still be so gradual as to baffle all attempts at a distribution into orders or classes founded on such data. Nay, what is still more, if the several partial lists so formed were to be concocted into one, by the addition into one of all the smaller numbers together and successively of the larger, still the same kind of regular gradation would appear, presenting no defined limits for a classification.

Let us therefore now return to the idea of a classification founded on the *orders of ramification.* This method appears to me the least objectionable, though it is by no means exempt from considerable defects.

By *ramification,* figuratively speaking, I understand generally the confluence of the streams, the one being regarded as recipient of the other; and by *order of ramification,* I refer to the order of the recipient, as being primary, secondary, &c., reckoned from the sea. Thus I say, a river falling directly into the sea is the primary recipient of the system to which it belongs, and all rivers falling immediately into this recipient form ramifications of the first order, whatever may be their number.

Thus, in *plate* 1, containing figures of the same hydrographic system differently arranged, and wherein each distinct stream is indicated by a different colour, *fig.* 1 represents a system having but *one order* of ramifications; AA *red,* being the primary stream, into which all the rivers, *aa* blue, fall immediately. In *fig.* 2, AA *blue,* being the primary stream, receives the red, which in its turn receives the yellow: here then are two orders of ramifications; and so on, as shown by the figures 3, 4, and 5, the last of which has five orders of ramifications.

Now an inspection of the most detailed maps will show not only that the largest rivers, generally speaking, are those which have the most orders of ramification, but that the very largest have not more than five orders. The number of each order may be very great, and thus a system with but two orders of ramification may be very extensive, and stretch, with a tree-like appearance, over a vast extent of country; and this, I grant, is a great objection to the method proposed. Yet were it to be adopted notwithstanding this defect, then all hydrographic systems comprising five orders and upwards would form the first class; those of four orders, the second; those of three, the third; and so on.

But a greater disadvantage still than the one already mentioned might be apprehended from an inspection of the plate; viz., that the same identical system may be arranged as one of the first, second, &c. class, according as we determine it to be composed of different orders of streams. Thus, if the system here represented be supposed newly discovered, and neither as a whole nor as regards any of its parts to have received any name, it may be asked,—what is now to guide us in our choice of an arrangement? Shall we say, as in fig. 1, AA *red* is a great trunk or river of the first order, receiving five other streams of the second order; or shall we determine, as in fig. 5, A A *blue* is a river of the first order, receiving one of the second order, which in its turn receives one of the third order, into which falls one of the fourth, and so on; or shall we adopt any of the intermediate arrangements? If we determine that the longest course shall decide the question, which is to be the trunk?—it may be disputed; A A *red, fig.* 1, being of the same length as A A *blue, fig.* 2, or A *a blue* and *red, fig.* 5. If we take the straightness of direction, the line *xy* of general direction is as straight, for A A *red, fig.* 1, as for A A *blue, fig.* 2. If we take the mass of water, it is evident that the stream below the confluence of any two streams is composed of those two; so that we see no reason why it should bear the name of the one any more than the other, particularly if the two of which it is formed furnish masses of water nearly equal, as is frequently the case. Neither the breadth nor depth can be well chosen to decide the point, as they are so variable in different parts of the same stream.

These difficulties would certainly be almost insurmountable if we had yet to decide on affluents and recipients; fortunately, most rivers are not only named, but in most cases it is already determined which are the recipients and affluents of each other. This determination, though extremely arbitrary, cannot now be changed, nor would it be advisable to change it; for in an artificial classification (the only one possible) it may be regarded as so much done, and by its means the class of any river, as depending upon the different orders of ramifications, may be settled.

For such rivers, however, as are not yet determined—and there are many in South America, where the greatest confusion reigns on this subject—it is advisable to follow some rule as a motive of determining which of two rivers shall be regarded as the recipient of the other.

From what has been already said, it will be evident that the arrangement and classification of rivers in general is by no means an easy task, nor is it less difficult to determine on the relative rank of the different parts of any individual system. It follows, of course, that if these objects cannot be classed, they cannot be specifically named. And yet I think it essential to clearness that the same word *river* be not applied alike to such immense water-courses as the Mississippi, the Marañon, &c., and the Thames or the Humber; and also that affluents be distinguished from their recipients by some specific appellative.

It will probably have been observed that I have constantly made use of the word *affluent* where in general the word *confluent* is employed. I have done so designedly, being desirous of the introduction of the word *affluent* into the language as a substantive.

The term confluent is generally used as applicable to a stream which empties itself into another. This is quite incorrect, and I would recommend the adoption of *affluent* instead. This word, an adjective with us, has become a substantive in French, and is universally used to denote a tributary stream. *Confluere* means to flow with, and cannot therefore with propriety be applied to a stream *before* its junction with another. *Affluere* means to flow towards, and is therefore, in my opinion, a much better word as applied to a tributary stream. I would make a still further distinction, calling generally by the name of *tributary* any stream which directly or indirectly contributes its waters to the main trunk; reserving the term *affluent* for such only as flow immediately into another river mentioned. Thus I regard both the Wabash and the Ohio as *tributaries* of the Mississippi, but the Wabash is not an *affluent* of the Mississippi. The Ohio is an affluent of the Mississippi, and the Wabash an affluent of the Ohio. I do not mean, however, to banish altogether the word *confluent*, but I would confine its application to a stream formed of two others, neither of whose names it bears. Thus the Thames is a confluent of the Thame and Isis; the Kerah, or Guna, a confluent of the Beyah and Sutlej, &c.

We frequently talk of a stream as being the *arm* of a river. I would strongly recommend, if we *must* use metaphorical language, the choosing, once for all, the most appropriate metaphor, and then abiding by the same. I shall have occasion hereafter to allude more particularly to this topic; at present I would say, that a tree bearing, of all things, the greatest similitude to a river, when we consider this on a map, with all its tributary streams, we should use only such terms as have relation to this similitude. Thus, I would talk of the *branches* of a river, not of its *arms*. We sometimes also say the *head* of a river; and though we say, a *body* of water, I have not yet heard of its *legs;* yet, if this language were adopted, the *deltoid branches* should be called the *legs*.

I know that a tree is in one respect the very reverse of a river. In the former the fluid flows from the bottom towards the top, or, more strictly speaking, both up and down; whereas, in a river, it is the very reverse, if we regard the mouth as the lower extremity. This objection might, however, be obviated by regarding the sources and little fillets of water, which give rise to rivers, as the roots of this aquatic tree. Indeed, this way of considering the subject has many advantages. In the first place, the direction of the current is more strictly analogous; and in the next, we are in the habit of considering our backs as turned to the source when we talk of right or left. Nor are there wanting vegetables, particularly among the climbers, in which the thickness increases as the distance from the roots is greater.

All this may be regarded as puerile, but I must persist in my opinion, that precision and appositeness in nomenclature are of more importance than is generally allowed. There will ever remain a contradiction of ideas in the employment of certain expressions. Thus we say to *ascend* the stream, which, in going towards its source, is proceeding towards the roots, while in a tree it is the reverse. Indeed, I hardly see any remedy for all this, unless by the framing of an entirely new nomenclature, which would not only be difficult in itself, but difficultly adopted. All that can be done is to reject what is bad, supplying its place, when we may, by terms more fit and likely to be accepted; and to find new names for those objects only which have as yet received none sufficiently specific. Something, I think, might be done, in regard to the branches of rivers and the islands they sometimes form, so as to convey more correct ideas of them than we can possibly have at present.

Of river islands I would establish two divisions, which I would term *branch-islands* and *channel-islands*. By the first I understand such as are formed by the anastomosing of the branches of a river. Most rivers present some of this kind in the lower part of their course, or where they flow through low and marshy ground. All deltas present a greater or less number of these, which, as a further specification, I would denominate *deltoid islands* (see fig. 2, pl. 3).

Thus, such branches of a river as after separation re-unite, I would term *anastomosing-branches;* or, if a word might be coined, *ana-branches*, and the islands they form, *branch-islands.* Thus, if we should say, " the river in this part of its course divides into several *ana-branches*," we should immediately understand the subsequent re-union of the branches to the main trunk, and be informed thereby of the existence of branch-islands and of a low and, in most cases, marshy soil. If we said, " the river in such a part formed a number of *branch-islands*," the same kind of knowledge would be imparted; that is, we should thereby understand the river to throw off branches which subsequently re-unite, as is generally the case in low ground.

The branches which I term *deltoid-branches* are evidently of two kinds. The outer branches I would term *deltoid-branches*—they are those which enclose the whole delta. From these there frequently branch off others, without anastomosing, forming merely smaller deltas within the larger one : such I would call *deltoidal-branches ;* and when there is anastomosis, I would call them *anadel-branches*, being an abbreviation of *anastomosing-deltoidal-branches.* I cannot but think, that names founded on this principle would greatly contribute to clearness in description.

By *channel-islands* I understand those not formed by any branching off of the river, but such as exist in its channel. Such islands are sometimes primitive; that is, they are composed of the same soil as that of the opposite banks, of which they are a continuation, or of a soil still more compact; and sometimes they are of secondary, or, more properly perhaps, of posterior formation, and composed of such sand or detritus as the river has brought down and deposited. In order, therefore, to distinguish them, I would call the first *bed-islands,* and the others *bank-islands,* if generally above the surface; reserving the name of *banks* for such as are generally covered or liable to shift, which those habitually above the water are not.

Thus, if, in describing a river, we should say, "its navigation is obstructed by a number of *bed-islands,*" we immediately perceive more or less difficulty in rendering it navigable. If we speak of obstruction from *bank-islands,* we may infer a greater possibility of removing the obstructions. At present, the term island having no definite idea, leaves our conceptions vague, so that we cannot have a perfect knowledge in any particular case but by means of much tiresome circumlocution.

Such a system of denomination furnishes us moreover with a variety of accessary knowledge, frequently of considerable interest. Thus, for instance, if we know the nature of the soil through which a river flows, and are told that it has many *bed* or *bank-islands,* we have immediately some idea of the degree of rapidity of the current; for if the bed-islands are of the same nature with the soil, and this be sandy, gravelly, or of loose earth, it is clear the river must have, and must for a long time have had, but very little velocity. *Bank-islands* will, in almost all cases, be indicative of a powerless current. If, having spoken of great rapidity and strength of current, we find the river to be, notwithstanding this, full of *bed-islands,* we immediately infer their compact nature; and if, in such cases, which however is unlikely, there should be *bank-islands,* they can only be formed of large stones, and are an indication of a diminished velocity of the stream, since it once brought down what it has no longer power to move.

The words *bed* and *channel* are frequently employed as synonymous terms when applied to rivers. There is, however, a difference, which will be rendered sensible by a little attention. By the channel I understand generally the course, and more particularly the deepest part of the course, of a stream; that which by the French is termed *chenal,* and by the Germans *thalweg,* or *talweg,* as the French write it. In the general sense, we say the channel is wide, long, meandering, straight, &c.; in a particular sense, we say it is deep, obstructed, and so forth.

The word *bed* would in these cases be improper. By this latter term I understand, as applied to a stream, that part of the channel over which the water generally flows, and that part of the basin of a sea or lake on which the water reposes. The bed of a river is of mud, sand, &c.; even or uneven, and so forth. When we say the *bed* is deep or shallow, we speak generally of the whole breadth of the channel; but if we say the *channel* is deep, we refer to the mid-current, or that part immediately below what the French call the *fil-de-l'eau*. A river does not always change the nature of its bed on changing its channel, and the bed is very different in different parts of the same channel; the terms, therefore, are not synonymous, and precision requires that in the use of them a due attention be paid to their respective meanings. Nay, further still, I should like to see the general and particular course of a stream precisely indicated by the settled signification of the terms *straight*, *serpentine*, *meandering*, *winding*, and some compounds of these. Thus a river may be straight in its general direction, but serpentine in detail; and thus, were I to speak of the direction of the Bermejo or Vermejo (Rio Grande), as laid down by Dercalzi*, I would call it *straight-serpentine*. I would say the same of the Magdalena. The Nile is *meandro-serpentine;* the Oronoco *winding*. Most rivers are simply *meandering*, if considered generally, and partake in different parts of some one or more of the different characters mentioned, and which might be specified in speaking of those parts. The fugitive and irregular forms of clouds have been classed, and the classification adopted: why not do as much for the general and particular course of rivers?

We talk also very vaguely of the *banks*, the *borders*, the *margin*, and the *brink* of a river. For picturesque descriptions it may be an advantage to have many words whose meaning is nearly the same. Verbal tautology is thereby avoided, to the benefit of style; but in a scientific point of view it is otherwise: here, if each of these terms be retained, its precise signification should be established. At present, the term *bank* means both the immediate edge, or border of the river, and the land for a certain undefined though not considerable distance on either side. Thus we speak of "steep and shallow banks," and "banks adorned with villas." The French have different terms, such as *rivage*, *rive*, *bord*, *berge*:—with them *rivage* is more exclusively applied to the sea, *rive* particularly associated with the word *fleuve*, and *bord* to the word *rivière*. Thus they say, "*Les rivages de la mer, les rives d'un fleuve, et les bords d'une rivière.* *Bord* is, however, sometimes applied to *rivière;* and if *rive* and *rivage* are not associated with *rivière*, it is probably to avoid an inharmonious repetition of sounds so similar. In point of fact, however, *bord* and *rive* imply the same thing, and have precisely the same general and particular meaning as our word *bank*. *Berge* (a German word) has, on the contrary, a different signification; it means those heights now at some distance (greater or less) from the river, but which seem to have been at one time its immediate banks. The Ohio is a remarkable instance of a river having two or three ranges of *berges*, rising above each other, at different distances; the last being in some parts visible at the foot of the most distant hills. We have not, I believe, any term particularly indicative of such banks, and when we would designate them must employ the term *bank* or *border*, with some explicative addition. Would it not, therefore, be advisable to adopt the word *berg* in the singular and *bergs* in the plural (to avoid the harsh sound of *berges*, pronounced as two syllables); to confine the term *banks* (as applied to the lateral limit or edge of a stream) to that part of the soil immediately washed by the stream; to restrict the word *border* to the nature of the vegetation at the water's edge, or to artificial works, as *bordered* with sedge, with forest trees, with quays of granite, &c.; to apply the term *brink* to the water's edge; and *margin* to the space between the *brink* and the *bergs*. I would further designate the margin as sloping (the French use the words *en talus* in this case); or *terplain* (from *terre-plein*), used adjectively or substantively, as occasion might be, if the space were horizontal.

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* See Bulletin de la Société de Geog. de Paris, No. 119, Mar. 1833.

But I will no longer dwell on the subject of rivers; it is perhaps one of the most difficult to class, and as to the names which are, or may be, given to whatever is connected with them, I have already said perhaps too much in explanation of my idea. I shall now revert to the necessity of adhering to one particular metaphor or comparison, when any such is requisite; and the more forcibly to point out this necessity, I will instance the case of mountains.

That the generality of mankind, limited in their conceptions, and considering all objects with reference to themselves, should be seized with awe at the sight of mountains many hundred times higher than the loftiest of their edifices, and that their expressions should partake of that confusion of ideas incident to exaggeration and ignorance, is no way to be wondered at; but that the learned, accustomed to study the universe with enlarged views, should make use of terms and comparisons such as are only befitting the least informed, appears to me a degradation of science and a mental aberration.

Doubtless, the sight of lofty mountains raising their summits above the clouds is well calculated, by comparison, to sink the stature of man into insignificance; but with relation to the globe of which they are a part, so far from being, as they have been termed, the frame-work, the skeleton, the *ossature* of the earth, which binds, strengthens, and sustains it—so far from this, I say, they are (if a parallel must absolutely be employed) but slight irregularities, little pustules on the epidermis of that huge body the world.

It is true that metaphor in general serves to raise the style; nay more, where the comparisons are just and well sustained, they are admirably adapted to rapidity of conception, and are therefore frequently employed with advantage even in scientific writings. But what are we to think of a metaphor, or rather of a confused jumble of metaphors, which pictures to us the mountains of the earth as "*Chains* springing from a *plateau*, as from a *mother-mountain*, and then reuniting by means of *branches* and *ramifications* to *succursal masses;* whence, as from a *central point*, or as from a *new trunk*, spring off a number of other *arms of the skeleton* and other *branches*, pushing their *roots* into Europe, of which they form the *nucleus;* which *nucleus*, in its turn, throws out fresh *twigs*, which form the *spinal-bone* of Italy, &c.!" Yet such is the literal and exact translation of a passage in a French work on physical geography, by a gentleman of title and considerable celebrity (still living, I believe). Nor need we look long before we find similar examples, though perhaps not quite so overcharged, in the works of our own countrymen.

Every one certainly is free to choose the comparisons which appear to him the best fitted for his purpose; but when he has chosen, I would say, let him stick to his tree like an ivy branch. To be serious, let him choose a just comparison and abide by it.

These comparisons, however, would be less necessary if the language of the science were fixed. In what regards the classification of mountains, as to bulk, direction, disposition, continuity, form, height, &c., it is particularly indefinite: plateau, mountain, mount, hill, hillock, highland, chain, group, cluster, mass, range, ridge, basin, valley, vale, defile, pass, passage, ravine, gully, slope, brow, face, pinnacle, needle, summit, point, cone, &c. &c., are all words having no definite or precise meaning.

Mountains have their absolute and particular heights—the former measured from the level of the sea, the latter from the base or bottom of the mountain itself. But what, I would ask, determines the limit of this base?—and when the plains, on different sides of the mountain, are themselves at different heights, as is generally the case, is not the particular height different, as taken from different parts?

As for the specification of particular mountains or ridges, I cannot too highly approve of the method adopted by M. Louis Brugiere, in his *Orographie de l'Europe.* I had myself hit upon the same expedient, about ten years since, with a slight modification, however, as I find by my notes. My idea was to denominate the principal chains by the double name of the basins they divide, and the secondary chains by the name of the streams flowing on their left; and I still think this method in some respects preferable. It is certainly shorter, and would moreover distinguish the primary from the secondary chains.

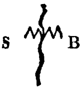
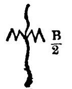
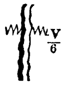
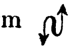
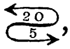
If from rivers and mountains, basins and valleys, we direct our attention to other objects, we shall soon see how completely insufficient is our present arrangement and nomenclature of every object of the science. Bay, gulf, roadstead, haven, port, harbour; promontory, headland, bluff, cape; peninsula, strait, shore, coast, beach, surge, wave, billow, swell; backwater, counter current, eddy, vortex, whirlpool, breakers; fountain, spring, source; stratum, layer, bed; cavern, cave, grotto, den; blocks, boulders, shingle; float-ice, sheet-ice, flake-ice, icebergs, land-ice, sea-ice; forests, woods, wilds, wilderness, desert, steppe; and hundreds of other terms, absolutely call for precise definition. What one traveller calls a *moist air*, another will call *dry;* water regarded as *fresh*, or at most a *little brackish*, by one, is accounted *salt* by another; winds are but relatively strong or weak, till the terms are defined. What is a fog, a haze, a thick atmosphere?—the transparency of the air is relative till its measure be determined, and that in a manner not to depend on the greater or less perfection of the observer's sight. What is a warm and what a cold air? &c. &c.

But I will no longer trespass on the patience of the Society: a word on maps, and I have done.

The French have set us an example on the subject of maps and plans, which I think we cannot do better than follow, after reducing their measures to our own, if it were found impracticable to adopt in this matter their decimal system. Twelve different scales are more than sufficient for every possible purpose of geography and topography; and the scales the French have adopted are certainly excellent. They have even gone farther, having determined, with the greatest precision, the length, thickness, and distance asunder of the lines by which elevations are represented in topographical maps, according to their respective scales. The heights of the letters and kind of writing is also fixed according to the nature of the object named and the scale of the plan. Nothing certainly can have been more carefully done; and the rules observed, in regard to maps and plans, at the *Depôt de la Guèrre*, cannot, in my humble opinion, be too highly extolled, too strongly recommended, or too universally promulgated by the Society.

Every geographical map, however small a portion of the world be represented by it, should bear the precise indication of the scale, and state from what meridian the degrees of longitude are reckoned. The want of attention to this latter object, but too common in many maps, is frequently most inconvenient. Another object, which I cannot but think very desirable, if it could be accomplished, would be the printing of streams of every kind in lines of a bright blue, instead of black; as also to cover all lakes with a flat tint of the same colour; and to etch all marshes and swamps in blue horizontal lines, as they are now done in black;

the sea should also be wholly covered with a tint of pale blue, or have a broad blue shading round the coast.

It has been proposed to turn to a useful purpose the double lines of the lower course of rivers by making those double lines commence where the river begins to be navigable. This might certainly be done in some cases, but as a general principle it is impossible, the scale of many maps not admitting of double lines at all. I would therefore propose, instead of this, a zigzag bar across the stream at the points where it begins to be navigable for different kinds of embarkation; indicated by a letter and number thus , for small boats or canoes;  for barges or large boats drawing two feet of water (changing the number as may be required);  sailing vessels drawing six feet of water, &c. These marks should be placed in all maps of a certain scale, as also another for the highest point at which the tide is felt; such, for instance, as a double arrow in this form , placed in the middle or on one side of the stream. I would also have the same tide-mark at the mouths of rivers and along the coast with a double number thus , indicating the highest and ordinary tides. Another improvement in our maps which I would likewise recommend, is to denote, by means of arrows and other marks at the confluence and bifurcations of rivers, which are the affluents and which are the recipients. As it is, we have frequently much difficulty in tracing rivers to their source, or from their source to their recipients.

Let any one, for instance, take a map of India, and determine, from inspection, whether it is the Hydaspes, the Ascesines, or the Hydraotes which falls into the Indus; and which of these three rivers is the recipient to the other two. Let him, in like manner, determine whether, after the junction of the Hyphasis and the Hesudrus, the river continues to bear the name of one of these, or takes another quite different from either;—whether, after the bifurcation of what I would call the *ana-branches*, one or both of them continue to bear the name of the stream thus divided, or any other; and finally, after the junction, what name the stream receives? The mere inspection of the map will hardly answer these questions. The trifling addition of a few arrows and marks will, however, make all clear. Thus I would place an arrow along the recipient stream opposite its tributary, reaching both above and below the confluence. For instance, in tracing up the river which flows by Moultan, the arrow shows me whence it comes. I continue to follow it up and I come to another confluence, where another arrow directs me on till I come to the name, and thus I find it to be the Chenab or Ascesines that flows past Moultan, and empties itself into the Indus. But for these arrows, I might suppose the Chenab to be an affluent of the Ravee, and that it was this latter river which flowed past Moultan on its way to the Indus.*

When two confluent rivers lose their names, so that neither is recipient to the other, I would place two arrows, as where the Begah and Sutlej unite to form the Kerah or Guna, and when, after the bifurcation of this latter, the two *ana-branches* (one of which re-assumes the name of Begah) re-unite to form one which again takes the name of Sutlej. A bar across both banks will here denote the loss of name. If, after a bifurcation, one of the branches retain the name of the divided stream, I would place an arrow along the stream which retains its name, and cut off by a bar the other branch. When both branches retain the name, I would place an arrow in the angle. It were needless to place the arrow where one of the streams being indicated by a double line, and the other by a single one, sufficiently denotes which is the recipient.

These arrows and marks need not be large, but should be distinct; they would not surcharge a map so much as inserting the name of a river in several parts of its course, as is often done, and as is not always sufficient; for although the name be written both on the upper and lower part of a river, the intermediate space may receive other names.

But of all things connected with maps, nothing is of greater importance than the orthography of the names of places and objects; and unless the principle on which we are to proceed in this matter be definitely arranged, we cannot possibly understand each other. Not only, therefore, should a principle be laid down for the future, but it is much to be desired that some one would undertake a book of synonymes, in which, under the most advantageous arrangement, would be found all the names, ancient and modern, by which any place or geographical object may be known. Nothing, certainly, can be of greater advantage to our further progress in any science than the knowledge of what is already done, and too much encouragement, I think, cannot be given to Mr. Babbage's plan of a work on the '*Constants of Nature and Art.* A great variety of geographical data exist, and if they were collected would be of incalculable benefit to our future researches, by preventing the loss of much valuable time in again doing, from ignorance, what has already been performed.

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* I here allude to these rivers as laid down by Rennell.

But although much is done, it is in reality nothing compared with what yet remains to be accomplished. When we reflect on the great variety of objects which constitute a knowledge of the earth and of its atmosphere, we see a vast field as yet but little explored. How much is yet to be known on the subject of winds, atmospheric pressure, temperature of the air in different regions, at different heights, and under different circumstances of season, &c.;—hygrometry, magnetism, electricity, local anomalies, changes of climate, &c.! What a number of heights yet to be ascertained, and depths to be sounded;—tides and currents to determine, with encroachments of the sea upon the land, and of the land upon the sea! How little do we know of the lowering of mountains, and elevation of plains; of the temperature of the water at different depths, and of the earth at different depths in different soils! What experiments yet to make on the reverberation of heat from different soils and under particular circumstances of aspect, vegetation, &c.! How ignorant are we still of almost everything connected with aqueous meteors, clouds, hail, &c.! What know we of the Aurora Borealis? of the formation of aërolites? In topography alone, what regions yet unexplored by, and unknown to, the inquiring eye of civilized Europe! What countless treasures may yet be reaped by the zoologist, the botanist, and the mineralogist in the vast continents of Africa, of South America, and central Asia! Yes, we know much, and yet we know but little.

But I must now conclude a paper already, I fear, much too long. Every one who has devoted his time to geographical studies must have felt over and over again the want of a proper, explicit, and comprehensive arrangement and nomenclature of the several objects of the science. Every other science has its language, and why should not geography? No epoch, certainly, was ever so well calculated for its determination as the present. It is but as yesterday that geographical societies have been formed. Their object is the advancement of science, and I cannot but regard classification and nomenclature as a most efficacious means; and when travellers shall be furnished with a systematic arrangement, and invited by the Society to adhere to its nomenclature, there is no doubt but that they will willingly conform; and their voyages and travels, universally read, would, as I have already observed, soon render general any newly-adopted terms.

To resume, then: I would beg leave to propose for the consideration of the Society the following objects, viz:—

1. The methodical arrangement and classification of the several objects connected with geographical science.
2. The adoption and promulgation of a definite, concise, but at the same time comprehensive system of nomenclature, such as

would raise geography in reality to the rank of a positive and exact science.

3. The collecting of all the well-authenticated and positively determined facts of the science, and their tabular arrangement in a concise and comprehensive form.

4. The framing of comprehensive and detailed instructions for all the observations to be made in every branch of the science.

5. The adoption of a general and improved system of maps.

J. R. JACKSON.

V.—*Papers descriptive of the Countries on the North-West Frontier of India:—The Thurr, or Desert; Joodpoor and Jaysulmeer.* Communicated by Lieutenant Alex. Burnes, late Assistant-Quartermaster-General of the Bombay Army; and drawn up, in 1830, while surveying these Countries by Order of the Bombay Government. With an entirely new Map. Read 10th April, 1834.

INTRODUCTION.—In the beginning of 1828 I was directed to proceed on duty, as an officer of the Quartermaster-General's department, from Cutch to the station of Deesa; and by extending my journey on that occasion as far eastward as the mountain of Aboo, I had an opportunity of examining the whole north-western frontier of the Bombay presidency. I found that our knowledge of the countries in that vicinity was most limited; nor did the great importance attached to this portion of our Eastern empire escape my notice. In July, of the same year, I therefore made proposals to the then Commander-in-Chief, Lieutenant-General Sir Thomas Bradford, to enter on an examination of them; and, as the tracts through which I should have moved would be bounded on the west by the Indus, I ventured to suggest that, if there existed no political objections to the measure, I might be allowed to descend that river, from where it is joined by the waters of the Punjab at Ooch, to the sea. I stated that, with the permission of Government, I would enter into inquiries both of a general and geographical nature; believing that there was much of interest in these countries, as concerned their geography and the people by whom they were inhabited.

His Excellency the Commander-in-Chief brought the plan to the notice of Government in a very favourable manner, and it met with the warm support of the Governor, Sir John Malcolm, who referred it to the Supreme Government in India. Before an answer could be received from Bengal, the Governor was pleased to enter into arrangements for my carrying it into execution. He referred its feasibility, in a political point of view, to the